COLLECTION AND ANALYSIS OF NEW JERSEY POTW EFFLUENTS FOR TRACE CONTAMINANTS ENTERING THE NY-NJ HARBOR

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PROGRAM OBJECTIVES

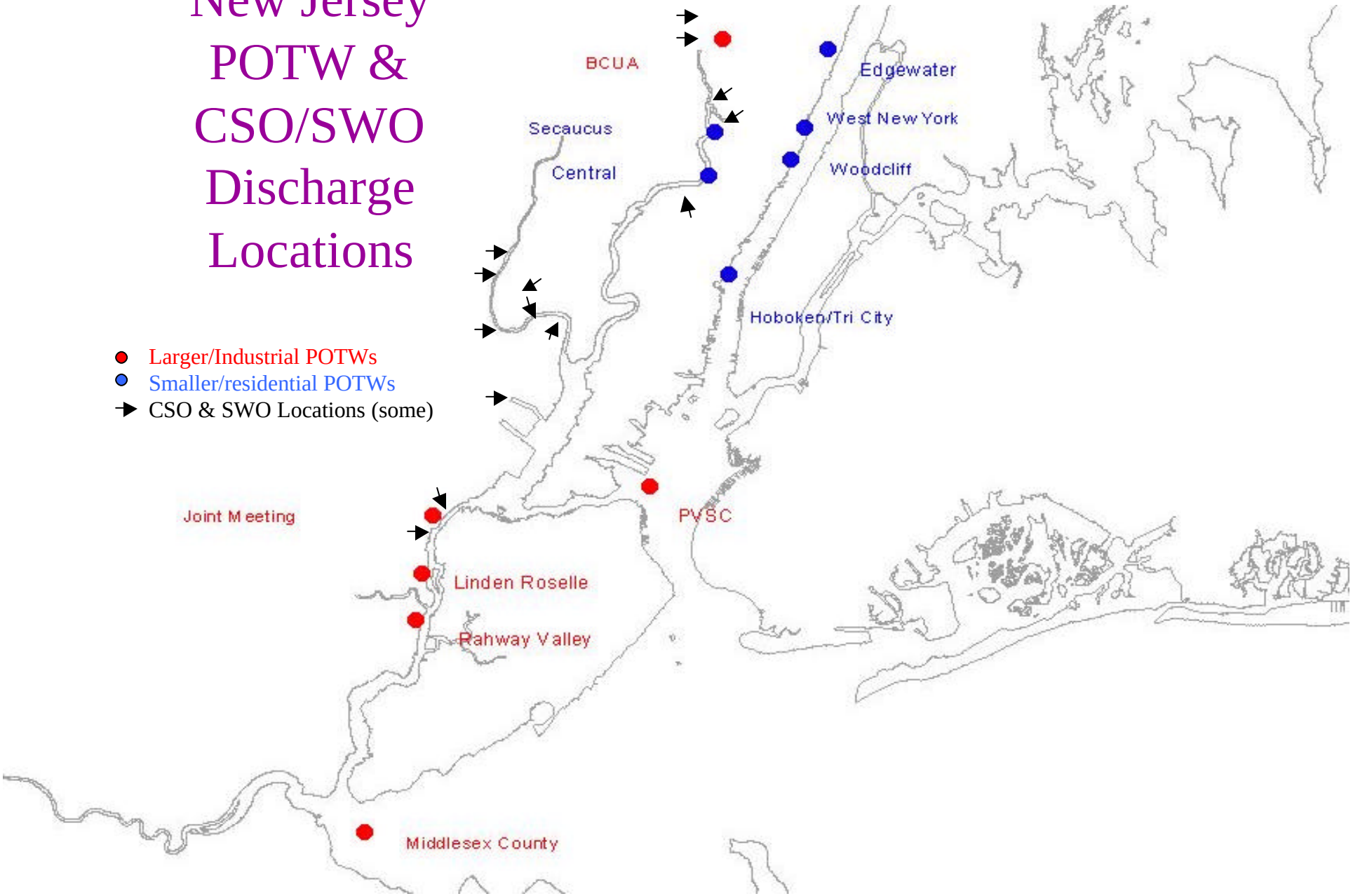
- Monitor POTWs, CSOs, SWOs
- Estimate Contaminant Loads
- Identify important contaminant contributions for subsequent track down

12 Northern New Jersey POTWs Sampled

(6 large and 6 small)

- 4 Sampling events for the large POTWs
- 2 Sampling events for the small POTWs
- Samplings scheduled seasonally in 2000/2001

New Jersey POTW & CSO/SWO Discharge Locations



Sampling Specifics

- 24 hour whole effluent composite samples
- Samples collected on ice
- Subsampling (2.5L) performed within 8 hours of sampling termination
- Subsamples shipped on ice overnight to analytical laboratories
- Samples processed and analyzed according to CARP protocols

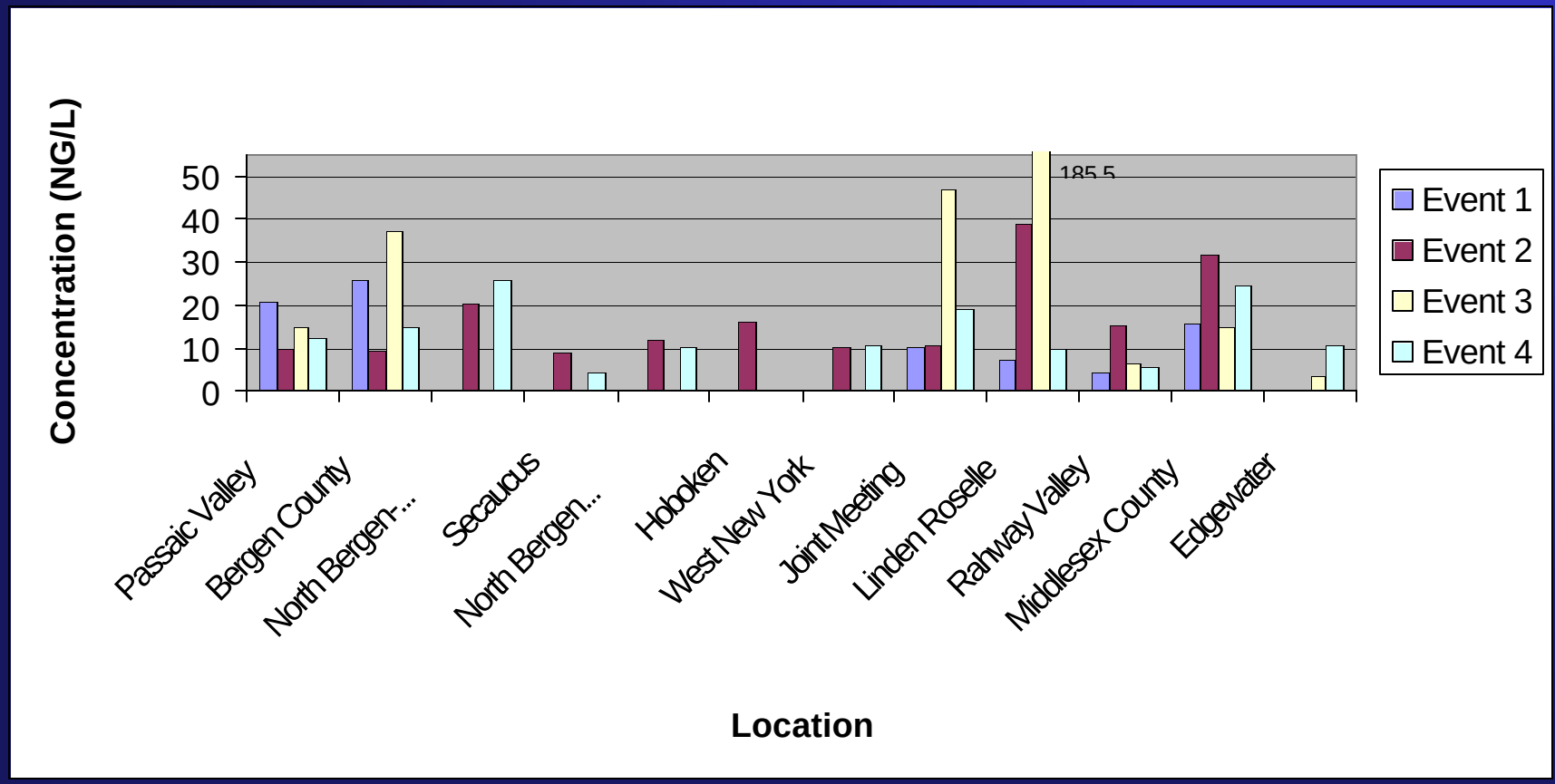
Constituents Measured

- PCBs - 146 congeners (EPA 1668 Rev-A)
- PAHs - 29 (NSNT/NOAA)
- Dioxins/Furans - 17 (EPA 1613 Rev-B)
- Pesticides - 28 chlorinated (HRMS isotope dilution)
- Metals - Mercury, Methylmercury, Cadmium, Lead

Total PCBs

- Range: 4,363 > 202,024 pg/L
- Interesting observation: POTW #1 samples contain high (~60% of the total PCB) levels of congener PCB 11 (3, 3′ - dichlorobiphenyl)
- POTW #1 has a number of pigment manufacturers

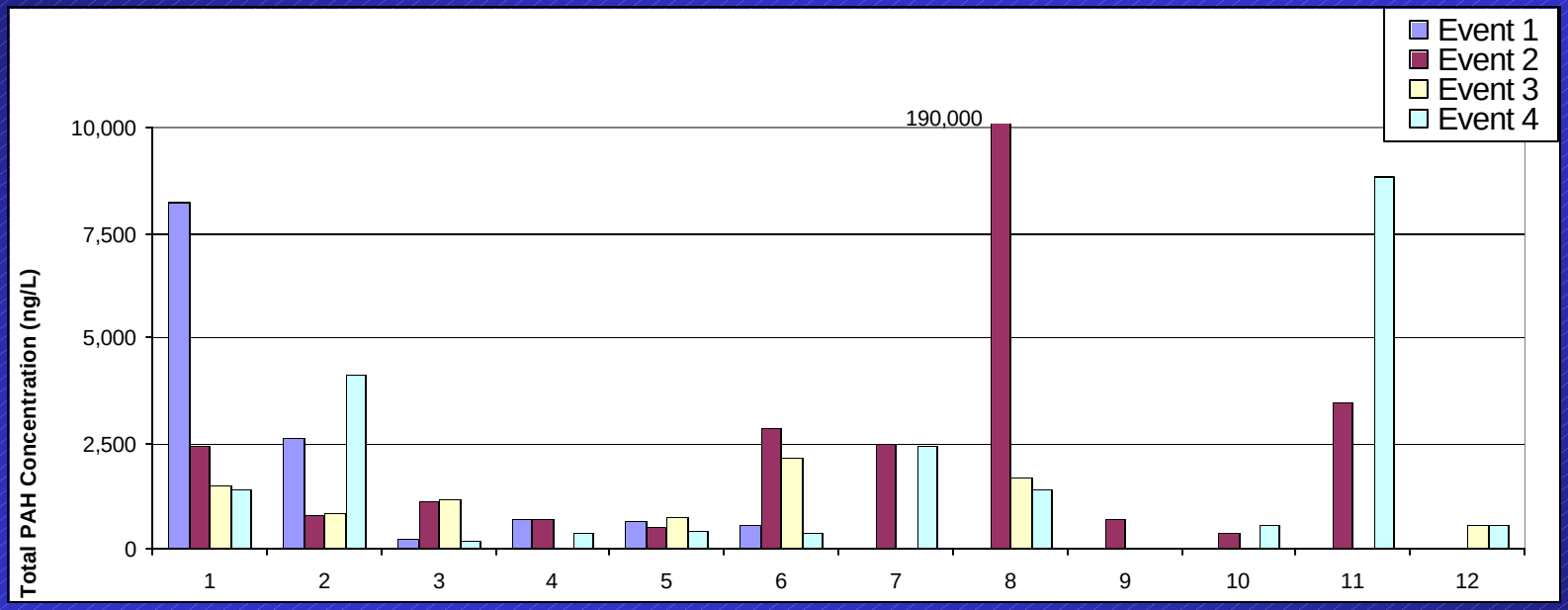
PCB w/o PCB11


Concentration (NG/L)
50
40
30
20
10
0
185.5
Event 1
Event 2
Event 3
Event 4
Passaic Valley
Bergen County
North Bergen- ...
Secaucus
North Bergen...
Hoboken
West New York
Joint Meeting
Linden Roselle
Rahway Valley
Middlesex County
Edgewater
Location

Total PAHs

- Range: 364-190,000 ng/L
- Fingerprints suggest PAHs are dominantly petrogenic

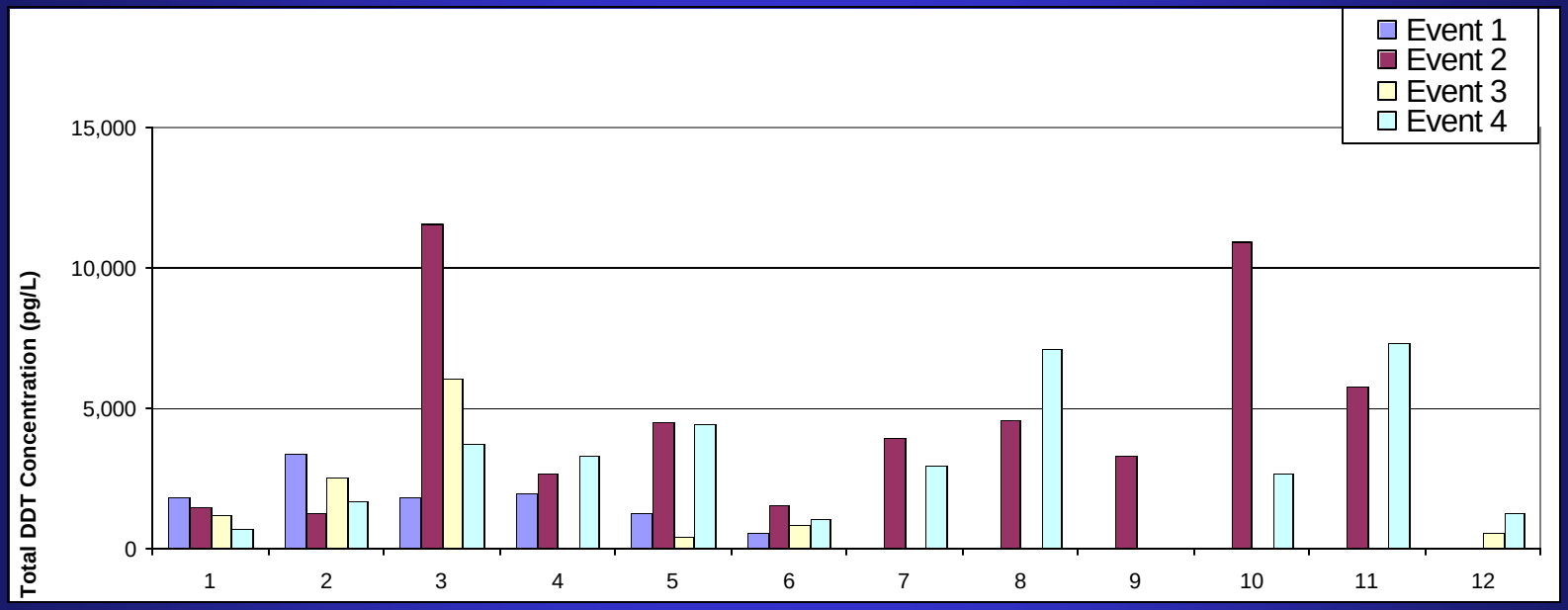
PAH


Event 1
Event 2
Event 3
Event 4
190,000
10,000
7,500
5,000
2,500
0
Total PAH Concentration (ng/L)
1
2
3
4
5
6
7
8
9
10
11
12

DIOXINs / FURANS

- Most Dioxin/Furan congeners not detected (ND)
- 2,3,7,8 - TCDD ranged from ND to 0.59 pg/L
- OCDD levels were highest (11 to 56 pg/L) and most frequently detected

DDT


Event 1
Event 2
Event 3
Event 4
Total DDT Concentration (pg/L)
15,000
10,000
5,000
0
1
2
3
4
5
6
7
8
9
10
11
12

Contaminant Loads for the 12 New Jersey POTWs Discharging to the Harbor

AVERAGE LOADINGS OF PAH, PCB, AND DDT IN POUNDS/PER DAY[a]

POTW	PAH	PCB	DDT[b]
Bergen	1.315	0.02168	0.00135
Edgewater	0.017[c]	0.00055 [c]	0.00003 [c]
Joint Meeting	0.318[d]	0.01277 [d]	0.00142 [d]
Linden Roselle	0.071	0.00308[e]	0.00061
Middlesex	1.529	0.03689	0.00101
N. Bergen-Woodcliff	0.0039[f]	0.00052 [c]	0.00015 [c]
N. Bergen Central	0.145[c]	0.00197 [c]	0.00021 [c]
Hoboken	0.071[g]	0.00233 [g]	0.00033 [g]
PVSC	7.883	0.23016	0.00301
Rahway	0.143	0.00486	0.00066
Secaucus	0.012[c]	0.00042 [c]	0.00017 [c]
West New York	0.391[c]	0.00125 [c]	0.00041 [c]

[a] Calculations based on average POTW discharges for the year 2000 and average parameter values measured to date in the NJ Toxics Reduction program. Parameter average values from four sampling events unless otherwise noted.

[b] DDT plus metabolites.

[c] Two sampling events.

[d] Three sampling events.

[e] Event #3 outlier excluded.

[f] Sampling events #3 and #4; outlier value from event #2 excluded.

[g] One Sampling event.

Some "New vs. Old" Comparisons for POTW Effluents

Parameter	Study			
	Current HEP (11 plants)		1982 EPA POTW Study (40 plants)	
	% of Detects	Range	% of Detects	Range
Cadmium, µg/L	100	0.04-0.43	28	2-82
Lead, µg/L	100	0.5-4.8	21	20-217
Mercury, ng/L	100	6-52	31	200-1,200
BHC, gamma, ng/L	100	0.52-1.68	33	10-1,400
Heptachlor, ng/L	100	0.1-1.37	2	30-1,500
Naphthalene, ng/L	100	19.2-2,606	6	1,000-24,000
Chrysene, ng/L	100	3.3-29.9	2	1,000-11,000
PCB, ng/L	100	16.7-104	1	500-2,600

ONGOING / FUTURE ACTIVITIES

- Collect and analyze about 40 CSO/SWO samples
- Prepare a Final Report
- Perform contaminant trackdown investigations at appropriate locations
- Implement contaminant reduction strategies
- Publish the results in a peer-reviewed journal

SIGNIFICANCE OF THESE RESULTS

- This is a unique data set of interest to many investigators
- With a few exceptions, the contaminant concentrations were low
- 2.5 liter whole effluent samples were appropriate for POTWs, CSOs and SWOs
- PCB 11 is one contaminant that should be pursued with a trackdown effort
- CSO/SWO samples are much more difficult to collect than POTW samples - particularly in a drought